PCT/AU03/01654

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I, JONNE YABSLEY, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2002953335 for a patent by CLICK N LEARN PTY LTD as filed on 11 December 2002.

WITNESS my hand this
Fifth day of January 2004

JONNE YABSLEY
TEAM LEADER EXAMINATION
SUPPORT AND SALES

CLICK-N-LEARN PTY LTD

AUSTRALIA
PATENTS ACT 1990

PROVISIONAL SPECIFICATION FOR THE INVENTION ENTITLED:

"COMPUTER SCREEN MOTION CAPTURE"
This invention is described in the following statement:

This invention relates to computer screen image and motion capture and in particular to a method for capturing and encoding computer screen image and motion for transmission via electronic means to remote locations.

BACKGROUND

The plethora of new software applications and their ongoing upgrades has spawned an industry skilled in training computer users how to best use the myriad of features contained in application software that ever grows in complexity. An adjunct to training is the need to provide "help desk" facilities to support computer users that phone for assistance but who can subsequently receive e-mail advice as well.

Specific training sessions for computer users comprise a combination of verbal and instructional show and tell sessions. Ideally each computer user can then try to perform the same process on his or her own computer so as to reinforce each aspect and feature of the application software. When a user can not afford or is unable to attend such a training session, instructions can be recorded on videocassette and Compact Disc (CD) format. Thus a user can playback each instruction when and as often as they desire. Helpfully when the program is supplied on CD format each instruction is indexed and quick access is assured, otherwise the computer user can play the instructions from beginning to end stopping or repeating instructions when they desire.

Unfortunately, it is not always useful for a non-skilled computer user to rely on assistance obtained from a video or CD nor is every situation and instruction that may be needed by them provided on the video or CD. Hence there are "help lines" that allow a user to speak to a person skilled in the particular computer program who can explain how to perform the task at hand.

In both the prepared and real time help scenarios the capture and playback of the instructor's computer screen is used to illustrate and reinforce the required cursor movement and the particular functions actuated to perform each task.

There exist a number of products that provide what is generally termed "screen capture video". Some products are being used for video playback during instructional sessions, others are used in the CD versions of instructional products and others are used to store and transmit the required tasks to the remote computer user who needs assistance by phone. The clear advantage of sending a computer user a recorded version of the required steps is that the user can not only see the moves themselves but they can store these steps away and play them again at any future time.

Most prior screen capture video products store bit map images of the screen (copy all of the pixel values displayed by the computer screen) at predetermined intervals (say one tenth of a second). Clearly this has a number of less than desirable features including the very large size of each screen grab (640 by 480 pixel array generates over three hundred thousand bytes of data at grey scale colour depth and three times that information for 16 Million colours). Each second of capture creates ten times the data described above.

This amount of data not only needs to be stored but if it needs to be transmitted elsewhere it can take a considerable time to do so using conventional modem technology of the day. This is so even if the file generated is compressed. Furthermore this method of capture will fail to capture some information that may have been useful, such as the change of a cursor from one symbol to another. It may also distort the movement of fast moving objects such that upon playback the cursor movement does not appear smooth.

In order to deal with the volume of data generated by each screen grab a general approach is to store only those pixel's that change from screen to screen. Assuming the capture is still at the rate of ten screens per second there will still be data absent and playback jerkiness can still arise. However, the computer needs to detect the difference between each screen.

The most basic approach to this task is for the computer to maintain a copy of the previous screen in a buffer and make a pixel by pixel comparison to determine the position and nature of the change and store that information in a Look Up Table (LUT). Each entry is time stamped so that the relevant change can be implemented during playback of the session thus recreating the each screen in succession.

The sophistication of current computer chips dedicated to such processing is such that moving pictures that provide cinema quality reproduction that is equivalent or exceeds film stock is now available for use in home theatre systems. Motion Picture Experts Group (MPEG) standards I and II with MPEG III and IV on the way include many techniques to compare and compress the digital data that comprises images (fast and slow moving across the screen) with high resolution and almost unmatched colour depth. Such sophistication is not however available to typical computer users and neither do they really need such detail. More so they do not want the still very large files sizes that are generated by such software even with the extensive use of compression.

Yet another way of capturing a screen is to record all the Application Programming Interface (API) codes used to generate the screen by the computer and encode all of the API function calls that call routines to perform all the screen display functions. The graphical API routines are executed in response to a plurality of graphical API function calls. The method comprises hooking the entire graphical API function calls so that when one of the graphical API routines is called the graphical API function call will be diverted to an encoding subroutine. If the graphical API function call was directed to the monitor, then a determination is made whether there are any dependent objects of the graphical API function call that need to be stored. If so, the dependent objects are stored in records. The graphical API function call is then stored in a record.

In fact ideally there is typically only a portion of the user's computer screen that is relevant to the computer user at the time, while it is typical to capture the whole screen thus contributing to large file sizes.

It is an aim of this invention to provide a method for providing a screen capture function that produces files that are small compared to prior screen capture products but that plays back with acceptable graphical reproduction quality. It is also an aim that the product of the method provides an alternative to current screen capture tools. It is a further aim to simultaneously capture audio that is included in the screen actions and which is added by the person as they record the screen images. The audio provides relevant verbal instruction about the actions being taken and can usefully reinforce those actions.

BREIF DESCRIPTION OF THE INVENTION

In a broad aspect of the invention a computer screen capture method consists of the following steps:

a) capture screen data at predetermined capture intervals of a selected area comprising the whole or part of a computer screen;

b) comparison of each successive captured screen data with the immediately preceding captured screen data to determine what area of the screen changes within one or more smaller areas of the selected area;

c) creation of an event list having an event interval at least equal to or less than the said predetermined capture interval containing none, one or more entries per interval, wherein said entries may be one or more of a unique reference to events representing visual change;

d) recreation of a previous and successive said smaller area of the selected area by playback of the relevant events in the event list;

e) compression of previously captured area to determine the minimum area of change and storing said minimum area; and

f) creation of a file containing at least minimum stored area, and an event list representing changes over time of the whole or part of the area of a computer screen.

In a further aspect of the invention between steps e) and f) the further step

e') comparing minimum stored area and discarding multiple copies and maintaining a store of unique minimum areas.

In yet a further aspect of the invention in addition to step a) the first captured screen data is stored unchanged.

A yet further aspect of the invention includes obtaining cursor image data that is obtained via an application programming interface call, storing that data and creating a reference to this data in the event list including the position of the cursor relative to the selected area.

It is a further aspect of the invention to playback the cursor motion by interpolating the position of a cursor and displaying it on the reconstructed screen more often than the screen is reconstructed.

It is an aspect of the invention that when the cursor is interpolated and the amount of movement between displays of the cursor is less than twice the maximum linear dimension of the cursor icon a threshold is reached, and area of the current reconstructed screen that is less than twice the area of the cursor is stored separately such that successive movement of the cursor between displays uses said separately stored screen area.

In a further aspect of the invention the created file containing minimum stored areas and an event list is compressed before sending the file over a computer network.

Specific embodiments of the invention will now be described in some further detail with reference to and as illustrated in the accompanying figures. These embodiments are illustrative, and not meant to be restrictive of the scope of the invention. Suggestions and descriptions of other embodiments may be included within the scope of the invention but they may not be illustrated in the accompanying figures or

alternatively features of the invention may be shown in the figures but not described in the specification.

BREIF DESCRIPTION OF THE FIGURES

Fig. 1 depicts four frames of a computer screen captured at quarter second intervals showing an open CorelDRAW application partitioned by dotted lines;

Fig. 2 depicts column three of each of the frames depicted in Fig. 1;

Fig. 3 depicts the process of comparing the images in successive columns;

Fig. 4 depicts the isolation of unmatched area/s in successive columns;

Fig. 5 depicts isolated graphical information from columns that have changed from a previous column this results from the processes depicted in Figs 3 and 4;

Fig. 6 depicts a pictorial representation of the bit map images that are stored during recording of the sequence;

Fig. 7 depicts an arrow shaped cursor and its associated hot spot;

Fig. 8 depicts an "I" beam shaped cursor and its associated hot spot;

Fig. 9 depicts an intermediate process of reconstruction of frames from the previously recorded data and minimising the size of stored bit map images by identifying common and changed areas within columns;

Fig. 10 depicts the step of identifying the smaller bit map that can then be stored to represent the change from one frame to its subsequent frame;

Fig. 11 depicts the processes involved in displaying the cursor for both fast and quick moving cursor movement; and

Appendices 1 and 2 depict an example of recording and playback controls useable by a person creating the screen capture and a person reviewing the captured screen images.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

The invention is described using the example of a computer screen and how to capture screen changes and movement in a form that can be used to recreate those features of the screen as well as movement of a cursor that is being manipulated by an expert user for eventual playback to a lesser skilled computer user. However, the invention can be used in a program that can benefit any user wishing to capture their on screen actions, the accompanying sounds and even recordings of their own voices for storage or transmission to others.

It also makes no difference that the computer screen being recorded may be displaying one or more programs that could be a spreadsheet, graphical drawing, engineering design, language tuition, or the operating system of the computer itself. Each screen is at any one time only a collection of picture elements (pixel's) that can be stored and manipulated to recreate the screen at any future time.

The reproduction of the screen and in particular any movement such as cursor movement across the screen and pop up and drop down activation areas /buttons is necessary to the quality of reproduction required by, in this example, a lesser skilled user or the user themselves. No particular standard of reproduction is provided by the invention.

Fig. 1 depicts four consecutive frames of a computer screen image captured at a predetermined period of time apart. In this example the time period is one quarter of a second hence the four screens have been captured over a three quarter of a second

period since the first screen is at t = zero seconds. Tick values are created from the available system ticks (it is not unusual for there to be 1000 ticks per second. Ticks thus represent 20 ms of time. To program for this feature the number of ticks per millisecond is used to set the interval so that four frames per second are captured.

In this example the area of the screen to be captured is the window of a CorelDRAW application which may or may not occupy the entire computer monitor screen. However, the invention can be arranged to record what changes occur over any size and any particular area of the computer screen. For example, this may comprise a portion of the screen that incorporates an active application window and a portion of the background desktop area.

The ellipse shape depicted in the example (Fig. 1) is seen to appear and increase in size over the period of the capture.

The program once set to record a designated portion of the screen captures that portion at each predetermined interval and in this embodiment each successive screen is compared "on the fly " during the recording process to determine those areas that have changed.

There is clearly a number of ways by which such a comparison can be made. In this embodiment the area is firstly partitioned into smaller areas than the area that has been captured. Equal width columns of 80 pixel's width have been used in this example however if the area is not equally divisible by 80 pixel's then the last column is less than 80 pixel's in width. As can be seen in the figures there are 8 columns across the width of the chosen area. The width of each column is variable however at this time a width of 80 pixels has been used.

The first column compared is the left hand most column starting at the first line (row) of pixel's down to the last, this is then repeated for each adjacent column until the last column is done.

For illustrative purposes the process is shown in detail in Fig. 2 where the changes in column 3 of successive frames are readily illustrated. In the figures that make up Fig. 2 it can be seen that the top and bottom areas of the column remain the same while the oblate shape increases in area covering more and more of the column.

When a first change in a pixel value occurs the line in which the pixel changes is used as the upper boundary of the block having changed pixel's. The lower boundary is determined to be the line that is above (precedes) the line which is unchanged from the previous frame. Note that a pixel is just a triple of numbers representing the colour of that picture element (additional numbers are sometimes used to represent other characteristics) so the comparison is of raw numbers.

The block in column 3 is identified in respect of the total screen by at least two elements. The first is the position of the top left-hand corner of the block say x=300 and y= 200 and the second is the bit mapped image (BMP) of width 80 by height 200 pixel's.

The first ever screen is saved in its entirety and located at x= 0 and y= 0 relative to the capture area not the screen area. The size of this block is obviously the maximum that needs to be stored and will be needed to begin the process of reconstructing successive frames.

It will be apparent that for each frame there will be a collection of BMPs of varying size stored in serial fashion with respect to the detected changes for each column in each frame. The nature of those BMPs is illustrated in Fig's 3, 4 and 5.

Fig. 3 depicts the exact changes for four successive frames in the same column while Fig.4 depicts the BMP blocks that have changed by reference to the areas of the columns that have been compared and show a relevant difference.

Fig. 5 depicts the actual BMP blocks saved during the recording process. The operations carried out are CPU intensive but not so much as to impede the operation

of the computer supporting the recording and application manipulation being captured.

Fig. 6 is a pictorial representation of the chronological collection of BMPs created during the recording phase. Such a file does not exist and Fig. 6 is merely a representation of the logical arrangement of all the stored graphical information.

The first frame is of course a BMP of the entire area being recorded. The second illustration is a captured BMP that represents the first area to change in column 1 of frame 2 there can be more than one BMP stored for each column for each frame. The remainder of the pictorial representation is representative of further frames and the BMPs stored in order of capture.

Programming of this feature however is likely to use an event list to coordinate the reconstruction process. The event list contains as preferred items:

- a reference to a unique BMP stored separately (the creation of unique BMPs will be described later in the specification);
- a cursor movement record (x, y);
- cursor image reference;
- screen size settings; and
- volume changes.

These items are exemplary and do not constitute the maximum or minimum number of items or necessarily the most appropriate items.

Creation of an event list based on our clock tick events, where none, one or more events representing visual change may be associated with each clock tick event that corresponds to the predetermined capture interval.

Each tick may or may not have a reference to one or more BMPs to reconstruct each frame in sequence and each tick may or may not have a cursor movement record, etc. This approach is an alternative to adding a time reference to each BMP and cursor

image and thus requiring the storage of all BMPs deemed to represent changes in successive frames.

The event list and BMPs are kept in separate locations so as to keep the overhead information associated with each BMP to a minimum. With regards the cursors, a separate file is used to store all the relevant cursors used during the recorded sequence (typically 32 and 32 pixel BMPs).

The size of a recorded sequence is proportional to the length of the recording if the total BMPs for each frame are stored. At four frames per second there will soon be many bytes of data to be stored and eventually transmitted to a remote recipient. However, clearly if there is little change the number of stored BMPs will be less than if there was a large amount of change. The size of a recorded sequence is proportional to the length of the audio recording regardless of whether there is sound or not.

As there is always a chance that some of the stored BMPs are the same it would be advantageous to identify them and eliminate duplications. Each eliminated BMP would be replaced with a reference to the same BMP that can be stored separately for calling up by the event list when required.

As the process of recording and comparison is ongoing it is also a feature of this embodiment that the cursor movement is recorded.

In this embodiment the cursor coordinates (x, y) are stored when a frame capture occurs. The cursor image is determined from API function calls and every time the cursor changes the new image is stored and the respective "hot spot" is stored with the cursor image data. The "hot spot" coordinate is that which is used to display the position of the cursor on the screen and is not necessarily the top left hand corner of the cursor image. All cursor data is stored in chronological order. Cursors are transparent BMPs. Fig's 7 and 8 are examples of two cursors and the dot denotes the "hot spot" of each cursor.

It is merely a preferable addition to the processes described thus far that there can be further reductions in the quantity of data to be stored and transmitted by further comparison of the BMPs currently stored to identify common and different areas.

To record sound creating a .WAV file is one way of doing so and which can accompany the recorded screen display. The Microsoft Windows OS provides a standard 22kHz WAV recording facility that can be initiated to record continuously during the screen capture process. It can record the audio created by the application being manipulated as well as that spoken by the user at the time of recording assuming they are using a properly arranged microphone.

In practical terms, but as measured by current technology, the CPU load can be high during the use of certain applications that need to be recorded. The recording process itself adds additional load, so the "on-the- fly" processing described above is importantly designed not to affect the responsiveness of the application being demonstrated. Thus, any additional processing to reduce the BMP sizes further can preferably be done when recording has ceased.

Thus in one example of how to further reduce the data required to be stored or sent, it is possible to reconstruct frames and compare the next BMP in the stream. Thus the previous fully reconstructed frame has the next BMP placed over it and common and uncommon areas are determined. The area of the next BMP to be placed on top of a fully reconstructed frame can then sometimes be reduced in size because there is an area of it that is common to the previous frame, within the existing width of the column. The comparison can be conducted in the same manner previously described.

It may be that the column width of the adjusted BMP is now reduced to a smaller size eg: 20 pixels width.

Clearly such an approach will further reduce the amount of data being stored as the average size of stored BMPs will reduce.

Figs. 9 and 10 illustrate an example of how this approach can be implemented.

Frame 1 in Fig. 9 is the first whole BMP that is retrieved, over which each of the stored BMPs can be located in a timed sequence. This process is not unlike the creation of a collage, which in this case creates a moving picture.

Only the activity associated with column 3 is depicted in Frame 2. As such the time order of the BMPs indicates that BMP 90 is to be located at x = 300 and y = 200 of the Frame. BMP 90 as such is shown in place and a copy of BMP 90 is shown on the side of the frame as if waiting in line to get on to the frame. Also shown is BMP 92 which is not actually the next BMP to be placed on frame 2 but is actually in a group associated with the time interval relating to frame 3. As is apparent in this example, BMP 92 will cover part of BMP 90. It is the common area of cover of BMPs 90 and 92 (see Fig. 10) that is recognised as being superfluous to BMP 92 and can be discarded. A smaller BMP 92′ (Fig. 10) results.

This trimming process which may reduce the width of each BMP is particularly CPU intensive and as discussed is preferably done after the screen recording process. However, that is not to say that with appropriately efficient programming and processor power it could not be performed "on-the-fly" during the recording process.

So as to further reduce the size of the stored BMPs, header data is removed and only colour information, (x, y) location information, height and width data is kept. However by performing this process on many thousands of BMPs the reduction of data can be significant. Yet a further reduction of the quantity of data associated with the stored BMPs can be achieved by identifying BMPs that are same following the width trimming process.

One way by which this can be done is to calculate the Cyclic Redundancy Code (CRC) of the colour values of all the pixel's in a BMP and compare the results to identify common BMPs. When common BMPs are eliminated, there will be a further reduction of the amount of data to be stored in the BMP data store. However, in the place of a removed BMP a reference to the remaining example of the common BMP is made so that the removed BMP can be substituted with the remaining BMP when required.

It is advantageous to have a facility to instantly play back the recorded screen capture if the receiving user does not have a compatible playback program. In which case it is possible to attach a copy of the playback software to the captured file. Once the file is double clicked to be opened the player self-extracts, installs on the users computer and plays the captured file.

A further reduction in overall file size is achieved using known compression technology. BMP images are amongst the easiest to compress using a known process called "zipping". Substantially smaller files are achieved when zipping BMP file types particularly on commonly coloured BMPs ie-monochromatic BMPs.

It is the .ZIP file containing the BMP data is part of the file that is communicated to the remote user.

The sound that was captured previously can also be reduced in size by using known compression technology and it is preferable that the .WAV file is converted to an MP3 file type. Conversion programs allow the quality of reply to be determined by settings that adjust the bit rate at which the source is sampled ie -the .WAV file. The higher the quality (higher bit rate) the less reduction in size of the file created. Notably, high compression rates can still provide adequate aural reproduction but achieve substantial reductions in file size.

Sound and screen playback synchronisation is achieved by recognising firstly that there is likely be a difference between the length of the MP3 recording and the screen

capture sequence when played back. For example for relatively short recordings say less than a minute the difference in time may be of the order of half a second. This degree of difference does not seem to be noticeable by users. However, for recordings of a minute or more the delay can be seconds, which will be very noticeable by the end of the playback sequence.

In a preferred approach, to better synchronise these elements, every 120 ticks the event list items that would have been used are delayed until the next tick occurs. The choice of 120 ticks is a matter of experimentation although this value can be varied.

Playback of the screen sequence can be handled in a number of ways the most basic being the linear playback where the sequence is played from beginning to end. In this case the first BMP is the first stored complete screen BMP over which all subsequent BMPs are located in time sequence. The overlay of the cursor and audio synchronisation is as described previously. However, the user may be a need to commence the playback at any point along the sequence. In that case, using the techniques described here in, there would need to be a delay in the provision of the sequence to the user as the frames were reconstructed from the very first frame to the beginning of desired playback sequence.

In practical terms the delay may be acceptable but it is also possible to capture complete screens at a different interval than the interval determined previously. For example, in addition to capturing four screens per second for processing in the manner described, full screens can be captured and their BMPs are stored every thirty seconds. Having the full screen available at thirty-second intervals means that the greatest delay in providing playback is caused in reconstruction from a maximum of thirty seconds previously. The reconstruction of course does not take thirty seconds but that the reconstruction process uses a complete frame from a maximum of thirty seconds previous to the point in the sequence the playback is to begin from.

It may also be advantageous to allow playback only from the thirty-second points of time along the sequence period. All the reconstruction described in catching up to the point in the sequence the playback is to begin, is done in the memory and computer processor without being displayed. The user only sees the playback from the point they designate.

It is an alternative to reconstruct selected whole frames at the point of playback. In other words pre-processing can provide complete frames (at predetermined intervals within the playback sequence) in memory prior to playback. Such an approach provides whole frames distributed throughout the playback sequence. A whole frame would only need to be reconstructed for every thirty-second period and this is considered sufficient to provide advantageous seek times for random access to the playback sequence. Such an approach eliminates having to save complete screens thus keeping the stored BMP size to a minimum.

As described previously an event list is created and stored during the recording period. This list is used to synchronise the time when, the various BMPs are overlayed on the current frame, when the cursor is placed on the current screen and when one or more of the audio files are played. Other event items are also stored in the event list.

Displaying the cursor during playback is handled in a preferred manner. The most basic approach would have been to playback the captured API calls and substitutes the saved cursor icons at the appropriate times when it changes. The approach described if played back at the four per second rate would likely provide a cursor movement that was not very smooth. Positional details that may be useful may not be displayed and the movement would not be pleasant to view.

In a preferred approach the cursor is displayed on the playback screen fifty times a second although this can be changed to reflect system capability or performance restrictions even though the cursor and its movement are recorded four times per second. The additional cursor image locations on the screen are interpolated, using in

this embodiment, a simple linear model for the movement between the previous and next cursor position. However, there is some difficulty in displaying the cursor on a frame that only changes four times a second as the cursor occupies a fixed area of pixels and that area may move at least twelve times before the next reconstructed frames is displayed.

One preferred approach is to take areas from the previous reconstructed frame (ie. that frame that is displayed during playback that represents the last quarter of a second of the sequence) and extract from it an area that is held separately in memory.

The extracted area can then be used to replace on screen the area the cursor moved from.

The cursor positions as stated previously are interpolated so their future position at any time is known. Thus it is possible to calculate what distance they will be apart between each display (ie. they are displayed at least twelve times every quarter of a second between frame reconstructions) in the embodiment described herein.

When the distance is less that a predetermined threshold of pixels (say 63 because this is just less than double the width of the standard cursor that is 32 pixels square) they will overlap. This is likely to occur when the cursor is moving slowly. A consequence of that is that the image behind the cursor needs to be replaced without showing the previous cursor position even though there is overlap of the cursors.

In this embodiment a predetermined area (for example 63 pixels by 63 pixels when the threshold is reached) is extracted from the last reconstructed frame beginning at the minimum x coordinate and minimum y coordinate of the two cursors and stored separately.

A first cursor image is placed on the displayed screen now showing the cursor in its first position. Then the second cursor image is placed over a copy of the extracted

area in its second position that replaces the same area again but the cursor is now in its second position within that area.

While the cursor is moving slowly and the distance between cursor movements is below the threshold, it is more economical to extract as small an area as possible. Hence for example when the cursors (one fiftieth of a second apart) are 20 pixels apart the area can be reduced to a worst case of 52 by 52 pixels in area.

The area can be thought of as a moving window of varying size and shape within which successive cursors are located. The shape is determined by the offset of successive cursors. In Fig. 11 the shape is denoted in dotted lines and forms a square because the cursors are displaced diagonally however if they had been displaced laterally then the area would have been rectangular.

However, when the cursor is moving quickly over the screen the area that needs to be stored is only that area to be occupied by the cursor, so that it can be replaced when the cursor moves on. The stored area over writes the previous cursor image as illustrated in Fig. 11.

In fact there are a number of operations are at work when the cursor is fast moving. The calculation of the distance between interpolated cursor positions determines both whether the threshold has been reached and where the cursor will be next. Once known, an area equal to the cursor area is extracted from its future position in the last fully reconstructed frame ready for replacing in the same position after the cursor has been displayed over that position.

The process of calculation, extraction and replacement is ongoing whether the cursor is moving slowly or quickly.

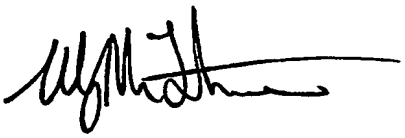
Appendices 1 and 2 depict an example of recording and playback controls useable by a person creating the screen capture and a person reviewing the captured screen images. The instructions that are provided in these examples do not disclose how the

features of the invention work but rather how they can be used. The use of various trademarks in the description are acknowledged and the laudatory description of the benefits of the invention are specifically disclaimed with regards any promise of the invention in this specification or any complete patent filed hereafter that relies on priority from this specification.

It will be appreciated by those skilled in the art, that the invention is not restricted in its use to the particular application described. Neither is the present invention restricted in its preferred embodiment with regard to the particular elements and/or features described or depicted herein. It will be appreciated that various modifications can be made without departing from the principles of the invention. Therefore, the invention should be understood to include all such modifications within its scope.

Dated this 11th day of December, 2002

CLICK-N-LEARN PTY LTD
By its Patent Attorney
MADDERNS



CaptureCAM-PRO HELP

Hello and welcome to the ***CaptureCAM™-PRO Help***.
CaptureCAM™-PRO with its revolutionary file format, forges a new standard of high quality video, while achieving the smallest file sizes in the world. CaptureCAM™-PRO's Full motion video and sound recording technology, makes it perfect for producing training, educational material and software support files. Unlike most PC Screen recording programs which produce AVI or QuickTime™ files, *CaptureCAM™* has its own unique format know as CCP. This new format makes it possible for *CaptureCAM™* to deliver high quality small movie files with previously unheard of smooth mouse movement.

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QUICK START

Making your first *CaptureCAM™* movie is easy just follow these steps:

1. Click the "REC" button on the *CaptureCAM™* interface. You are now in record mode, anything you do inside the *CaptureCAM™* frame will be recorded.

2. Click the "STOP" button and save your movie. You have just made a *CaptureCAM™* movie. It is possible to watch your new movie by clicking on the "PLAY" button.

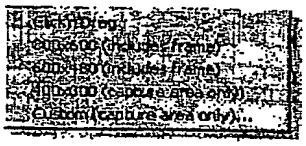
3. To apply CaptureCAM's size reducing algorithm, click on the "POST PRODUCTION" button and click "PRODUCE". The unique *CaptureCAM™* compression algorithm has been applied and the size of you movie has been drastically reduced without loss of quality. Click the "PLAY" button and be amazed.

TOP

SETTING A FRAME SIZE

CaptureCAM™-PRO allows you to have any frame size you like for your movie. You can choose from 3 different presets or type in your own Custom size. You can even 'Click'n'Drag' to the size you want.

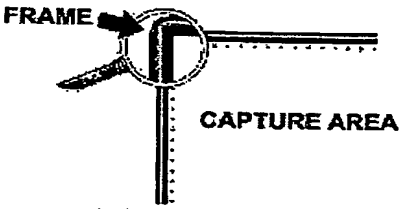
To set the Frame size of your movie, click the 'Frame Size' button on the control bar and the Frame size menu will appear. There are 5 options to chose from, they are as follows.



1. Click'n'Drag: when this option is selected your mouse cursor will turn into a cross hair, click on your desktop and while holding you left mouse button down, drag across the screen until you get to the size you would like your Frame to be, then release the mouse button.

2. 800x600 (includes frame): this option will create a frame size that is 800 pixels wide by 600 pixels high. This includes the size of the frame its self which is 8 pixels thick. This means that your actual recording area is approximately 792x592. When you select this option, your mouse cursor will turn into a cross hair. Click on your desktop to set the top left hand corner of the frame.

3. 600x480 (includes frame): this option will create a frame size that is 600 pixels wide by 480 pixels high. This includes the size of the frame its self which is 8 pixels thick. This means that your actual recording area is approximately 592x472. When you select this option, your mouse cursor will turn into a cross hair. Click on your desktop to set the top left hand corner of the frame.



4. 400x300 (capture area only): this option will create a recording or capture area that is 400 pixels wide by 300 pixels high. This doesn't include the size of the frame its self. When you select this option, your mouse cursor will turn into a cross hair. Click on your desktop to set the top left hand corner of the capture area .

5. Custom (capture area only): this option allows you to type in any recording or capture area size that you would like. Type in the width and height in pixels and click the "X". Your mouse cursor will now turn into a cross hair. Click on your desktop, this is where the top left of the capture area will be.

HINTS & TIPS:

- The CaptureCAM™ frame will not be recorded. It is only there to show you the recording area.
- When you have a movie open in CaptureCAM™, you toggle the frame on or off by holding the Alt key and tapping the F11 key on your keyboard.

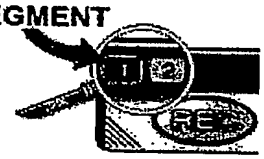
TOP

RECORDING PROCESS

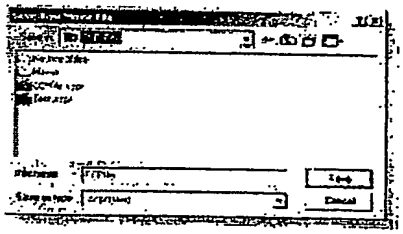
RECORD: to start a recording, just click the "REC" button. You will notice the timer ticking over and the text "Recording" begin to flash on the right hand side of the Control Bar.

PAUSE: to pause the recording, Just click the "PAUSE" button. You will notice on the top left side of the Control Bar a small icon with a number appears, this is a "Segment" icon. Every time you click record and then pause, a "Segment" is created.

RESUME: to resume recording, just click the "REC" button again. If you click pause again you will notice another "Segment" has been created.



STOP: to stop the recording, click the "STOP" button. A dialog box will appear prompting you to save your movie. This will save your movie in CaptureCAM™'s "RAW" format. If you don't want to save, just click "CANCEL". *(NOTE: If you click "CANCEL" at this point, your movie will be lost).*



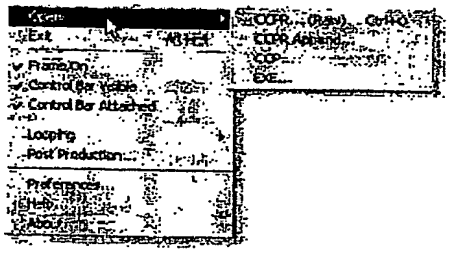
HINTS & TIPS:

- A quick way to start and a pause the recording process, is tap the F12 key on your keyboard. This will toggle between record and pause.
- If you have just recorded a "Segment" but would like to delete it, just hold the "Ctrl" and "Alt" keys while tapping the "X" key on your keyboard. *(NOTE: it is only possible to delete a segment before you begin recording another).*
- It is also possible to append movies. (for more info see the section called "Appending Movies")

OPENING MOVIES

TOP

When opening a movie for the first time, right click on the Control Bar, select "Open" and you can chose from one of the following 3 file types that CaptureCAM™ produces.



1. CCPR..(RAW): This stands for "Capture Cam Pro Raw". This is the file type that CaptureCAM™ creates when you first save your movie after the "STOP" button has been clicked. As the name implies it is CaptureCAM's RAW format and is what Post-Production uses as it's bases to work with. The file size displayed immediately after recording reflects the RAW file size.

2. CCP: This is the file format that has the CaptureCAM™ algorithm applied to it when in Post-Production.

3. EXE: This is the "Self Executable" file format that includes the CaptureCAM™ PLAYER.

When you have a RAW (CCPR) file open, another option will be come available in the "Open" dialog, "CCPR Append.... When a movie is already loaded you can also right click on the capture area to get to the "Open" dialog.

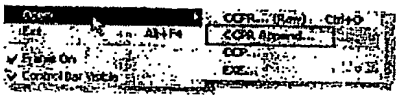
HINTS & TIPS:

- A quick way to open CCPR or CCP files, is to just double click on them. CaptureCAM™ will automatically open up with the selected file.
- You can open CCPR files by just simply holding the Control key and tapping the "O" key on your keyboard.

TOP

APPENDING MOVIES

Once you have created a number of movies, it is possible to "Append" these movies together to make one movie while still retaining them as separate movies. When two or more movies are appended, they become one movie but there segments remain separate. For example: If movie one has 3 segments and movie two has 4 segments then the new combined movie would have a total of 7 segments. To append movies together simply do the following.



1. Open a movie in it's "RAW" format (CCPR) into CaptureCAM™. Right click on the Control Bar and select "Open" and select "CCPR..RAW".

2. Right click on the Control Bar and select "Open" and then select "CCPR Append..".

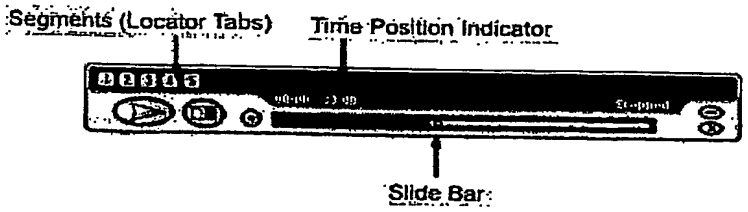
3. Repeat step two for every movie you wish to append.
(NOTE: it is not possible to append CCP files).

TOP

NAVIGATING A MOVIE

There are two possible ways to locate to a particular location in a movie, they are as follows:

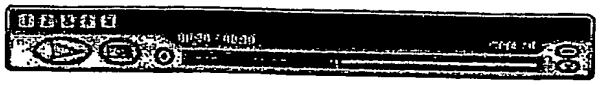
Segment/Locator Tabs: If segments have been created, then these can be used to navigate to a particular location within a movie. Click on any of the available Segments/(Locator Tabs) to move to different positions within the movie. These locator tabs are often strategically used for key points within a movie:
(NOTE: The movie may take a few moments to locate)



Slide Bar: Move the slide bar while playing or paused to locate a new position within the movie *(NOTE: The slide bar does not provide instant locating or slow motion playback)*. The TIME POSITION INDICATOR updates while moving the slide bar to help find specific time points.
(NOTE: The movie may take a few moments to locate).

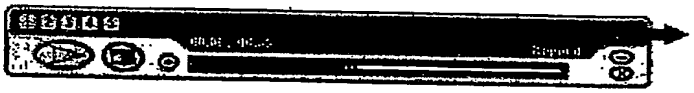
TOP

CONTROL BAR



DETACHING THE CONTROL BAR: Double click on the Control Bar to detach, Double Click again on the Control Bar for it to re-attach.
(NOTE: The Control Bar will not re-attach if the Movie Screen is off the edge of your desktop.)

RE-SIZINGING THE CONTROL BAR: When the Control bar is Detached, you can resize the it if you Click and drag the Right hand edge.



HIDING THE CONTROL BAR: To toggle between Hiding and Showing the Control Bar, just tap the F11 key on your keyboard.

HINTS & TIPS:

- To control the movie with the Control Bar hidden, make sure you have "Use Keyboard Shortcuts" checked in Preferences, then you can use the following keyboard shortcuts.

PLAYBACK:
Space Bar: Toggles between Play/Pause/Resume.
Alt + Space Bar: Stop

RECORDING:
F12: Record/Pause/Resume Record.
ESC: Stop Recording

VOLUME:
Up Arrow: Increase the Vocal track.
Down Arrow: Decrease the Vocal track.
Alt + Up Arrow: Increase the Music track.
Alt + Down Arrow: Decrease the Music track.

- You can also toggle between Playing and Pausing of a movie by double clicking on the capture area.
- Right clicking and on the capture area will also let you control Playing and Pausing of a movie.

TOP

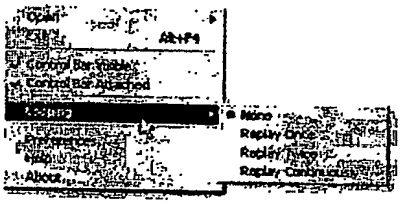
LOOPING PLAYBACK

It is possible to set how a Movie will Loop in one of the following three ways:

Replay Once: The Movie will play through twice and then stop.

Replay Twice: The Movie will play through three times and then stop.

Replay Continuously: The Movie will Loop until you click the STOP button.



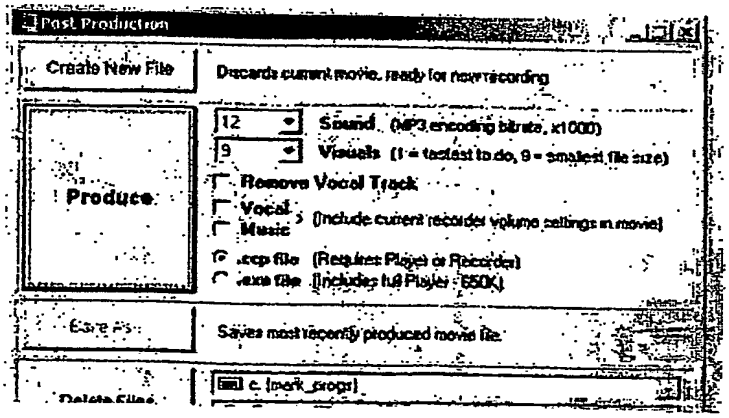
TOP

POST-PRODUCTION

Post-Production is where you will make some decisions about your new movie, as well as a number of other things. Post-Production is split into four sections, they are as follows:

1. CREATE NEW FILE: This option is used to discard the current movie ready for a new recording.

2. PRODUCE: This option has a number of settings and they are as follows:
Sound: Adjusts the quality of the vocal track and has a range from 8 bit to 40 bit.
Visuals: Adjusts the speed of the processing once the "PRODUCE" button has been clicked verses reducing the file size. This ranges from 1 to 9.
Remove Vocal Track: this will take out the vocal



track from the current movie, across all segments.

Vocal: If this option is checked the Vocal volume that is set in Preferences will be recorded with the movie. This means that every time a user plays this movie, the Vocal volume will be set to this setting.

Music: If this option is checked the Music volume that is set in Preferences will be recorded with the movie. This means that every time a user plays this movie, the Music volume will be set to this setting.

CCP: If this option is checked the movie that is produced will be in the CCP file format which requires the CaptureCAM™-PRO PLAYER to be installed on the users system.

EXE: If this option is checked the movie that is produced will be a "Self Executable" file, that does not require the CaptureCAM™-PRO PLAYER to be installed, however this version of your movie would be larger than a CCP version, as it includes the components for the PLAYER. The increase in size would be approximately 650K.

3. SAVE AS: This option is where you would save the current "Produced"movie. This option is grayed out until the "PRODUCE" button has been clicked. Once the "PRODUCE" button has been clicked, you can comeback into POST-PRODUCTION and save your movie in it's "Produced" format.

4. DELETE FILES: This area is where you can manage movie files, you can view all three types or just one type. Just select the type, highlight the files on the right and click delete.

TOP

VOLUME CONTROL

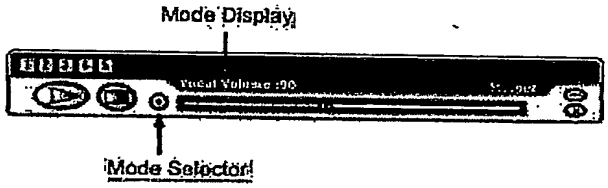
The Slide Bar can also be used to adjust the Vocal and Background Music volume levels. To change the Slide Bar's function you must first click the "Mode Selector" button.

Mode Selector: Click this button to toggle between:

1.Vocal volume adjustment (Light Green)

2.Background Music Volume adjustment (Dark Green)

3.Standard Movie Position Mode adjusment. (Red)

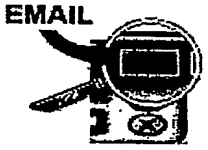


When one of the volume modes is selected, move the slide bar to change volume. A number representing the volume will appear in the display. After 5 Seconds the Mode will return to "Standard Movie Position Mode". *(NOTE: these settings will not effect the volumes that get recorded in the movie if you have selected "Include current recorder volume settings in movie" in Post-Production).*

TOP

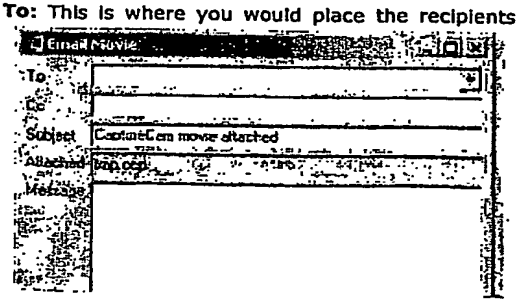
EMAIL

CaptureCAM™ has it's own built in Email program that makes it easy to send a movie to as many users as is required. Once a movie has been recorded and saved an icon of an envelope will appear in the top left of the Control Bar. Click this icon to go to the Email Dialog. *(NOTE: If you have not applied the CaptureCAM™ algorithm to your movie, a dialog box will appear, Warning you that you are about to send a CaptureCAM RAW file which can be very large. In most cases you would not want to send a RAW file, so click "NO" and go back Post-Production and click "Produce").*



The Email Dialog is set out much like a standard email program and is divided into 6 sections. These sections are as follows:

To: This is where you would place the recipients email address. All email addresses you have previously typed in will be recorded here, so if you are emailing to a previous user, you can just click the down arrow and select their address from the drop down list.



Cc: Place the email addresses of all recipients of your movie here.

Subject: This is the text that appears in the recipients Subject line of their email program. To change just click in the box and type.

Attached: This displays the name of the attached movie file. You can not change this here.

Message: This is the text that will appear in the message area of the recipients emil program.

Status: Once the "Send Movie" button has been clicked this area will show you the progress of the email being sent.

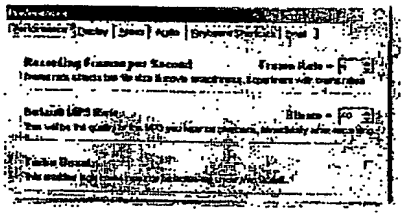
Send Movie Button: Once you are ready to send your movie just click

this button.

TOP

PREFERENCES

To get to Preferences, right click on the Control Bar and select Preferences from the dialog. The Preferences dialog is divided into 6 tabs, they are as follows:

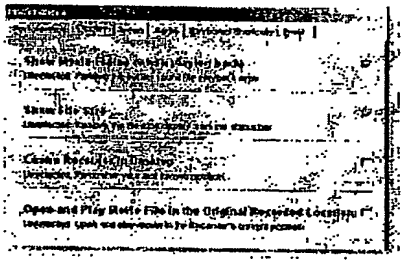


PERFORMANCE: This tab has 3 settings, they are as follows:

Recording Frames per Second: This option sets the Frame Rate for your movie. The higher the Frame Rate the smoother the movie, however higher Frame Rates will increase file size. A good average would be between 8 and 12 Frames per second. However it is a good idea to experiment with Frame Rates to get the right balance for your computer.

Default MP3 Rate: This option determines the quality of the vocal track heard immediately after the "STOP" button is clicked. The range for this option is between 8 and 300. *(NOTE: this setting does not effect the Sound option in Post-Production).*

Turbo Boost: This option allows users of Windows 98/ME to achieve higher Frame Rates. This options is automatically checked for Windows 98/ME systems. Turn this feature on for Windows XP or 2000 is not recommended, as it will impede performance.



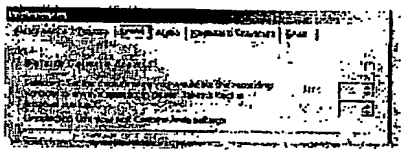
DISPLAY: This tab has 4 settings, they are as follows:

Show Movie Frame (when playing back): This option hides or shows the Frame when a movie is played back. Default is Show movie Frame (checked).

Show File Size: This option will hide or show the file size of the movie that is displayed on the Control Bar. Default is Show file size (checked).

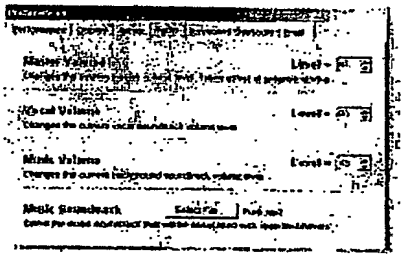
Centre Recorder in Desktop: If checked this option will always place CaptureCAM™ in the centre of the desktop, every time it is opened. If unchecked CaptureCAM™ will open at the location it was last, when shut down. Default is remember last known position (unchecked).

Open and Play Movie File in the Original Recorded Location: If checked all movies opened in CaptureCAM™ will play back in their original recorded position. If unchecked movies will open in CaptureCAM™ current location. Default is play back movie in CaptureCAM's current location.



AREA: This tab has 1 setting as follows:

Default Capture Area: If this options is checked you can set in pixels, the size the capture area will always be, when CaptureCAM™ is run. If unchecked the last known capture area will be used. Default is use last known capture area (unchecked).



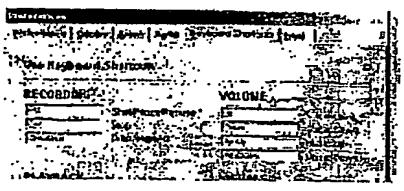
AUDIO: This tab has 4 settings, they are as follows:

Master Volume: This option sets the Master Volume level at program startup. The settings are between 0 and 100.

Vocal Volume: This option sets the Vocal Volume level at program startup. The settings are between 0 and 100. (NOTE: this is the setting that will be used by Post-Production, if the "Vocal" option is checked).

Music Volume: This option sets the Music Volume level at program startup. The settings are between 0 and 100. (NOTE: this is the setting that will be used by Post-Production, if the "Music" option is checked).

Music Soundtrack: Here you can select the MP3 background music. *(NOTE: the MP3 doesn't get recorded with the movie therefore if you use an MP3 other than the preset supplied, you will have to send a copy of that MP3 with the movie and have it placed in the Backmp3files folder inside Click-N-LearnCCP\CCP Rec).*



KEYBOARD SHORTCUTS: This tab has 1setting as follows:

Use Keyboard Shortcuts: If this option is checked then the keyboard shortcuts will be active. Default is use keyboard shortcuts. To change a keyboard shortcut, click in the box and the current shortcut will disappear, type in a new shortcut and you have now assigned a new keyboard shortcut. To reset the Keyboard shortcuts back to their Default settings, click the button "Reset this Page to Defaults".

EMAIL: This tab has 2 settings and they are as follows:

Email Address: If your Email Address was either found or you typed it in on install of CaptureCAM, there will be no need to adjust this setting unless your Email Address changes. (NOTE: If this box is blank then CaptureCAM's built in Email program will not function correctly).

SMTP Address: This is the address for your out going email. If your SMTP Address was either found or you typed it in on install of CaptureCAM, there will be no need to adjust this setting unless your SMTP Address changes. (NOTE: If this box is blank then CaptureCAM's built in Email program will not function correctly).

TOP

KEYBOARD SHORTCUTS

When "Use Keyboard Shortcuts" is checked in Preferences, then the following keyboard shortcuts will be available.

PLAYBACK:
Space Bar: Toggles between Play/Pause/Resume.
Alt + Space Bar: Stop

RECORDING:
F12: Record/Pause/Resume Record.
ESC: Stop Recording

VOLUME:
Up Arrow: Increase the Vocal track.
Down Arrow: Decrease the Vocal track.
Alt + Up Arrow: Increase the Music track.
Alt + Down Arrow: Decrease the Music track.

VISUALS:
F11: Toggles between hiding and showing the Control Bar.
Alt + F11: Toggles between hiding and showing the Frame.

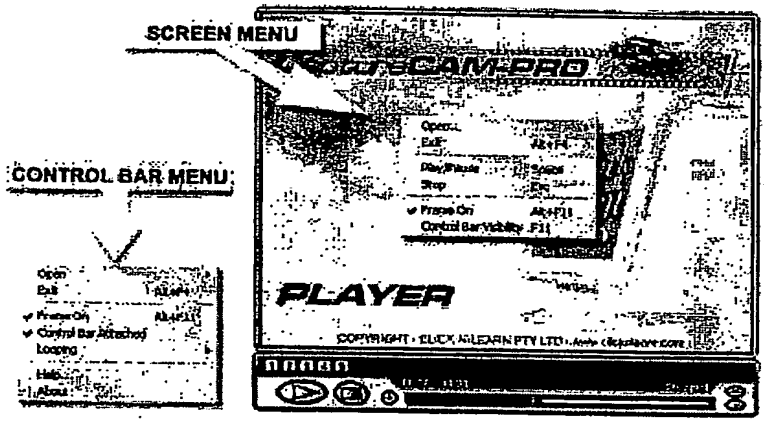
CaptureCAM-PRO PLAYER HELP

Hello and welcome to the ***CaptureCAM™-PRO PLAYER Help.***
The *CaptureCAM™-PRO PLAYER* is designed to play back movies made with ***CaptureCAM™***. Unlike most PC screen recording programs which produce AVI or QuickTime™ files, *CaptureCAM™* produces its own revolutionary file format know as CCP. This new format has forged a new standard of high quality video, while achieving the smallest file sizes in the world.

ACCESSING MENUS

Right click on **Screen** area to access the Open and Play Menus.

Right click on **Control Bar** to access the Open and other Menu items.

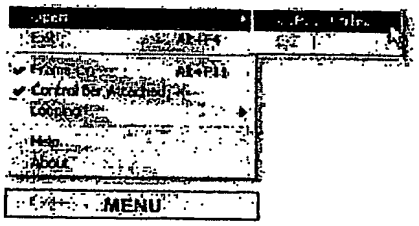


OPENING A MOVIE

There are 2 ways to open a movie in the ***CaptureCAM™-PRO PLAYER***, they are as follows:
Option1:
Double click on a file with the .ccp file extension.
All CCP files display the icon see here >>>>>>>>>>>>>>>

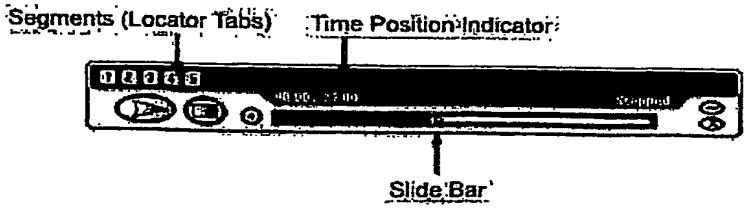
Option2:
Right click on *CaptureCAM™-PRO PLAYER* Screen or the Control Bar to access the Open menu. Navigate to the CCP file.

Shortcut: Ctrl + O



MOVING TO DIFFERENT LOCATIONS WITHIN A MOVIE

Segment/Locator Tabs:
Click on any of the available Segments/(Locator Tabs) to move to different positions within the movie. These locator tabs are often strategically used for key points within a movie:
(NOTE: The movie may take a few moments to locate)

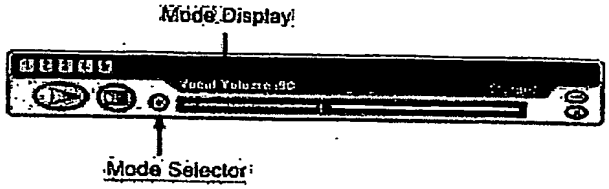


Slide Bar:

Move the slide bar while playing or paused to locate a new position within the movie (NOTE: The slide bar does not provide instant locating or slow motion playback). The TIME POSITION INDICATOR updates while moving the slide bar to help find specific time points. (NOTE: The movie may take a few moments to locate)

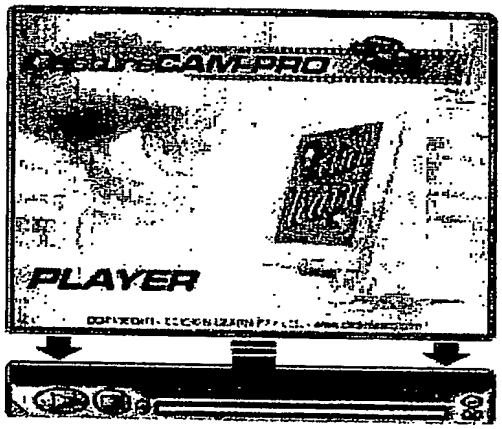
VOLUME CONTROLS

Mode Selector:
Click this button to select between.
1.Vocal volume adjustment (LightGreen)
2.Background Music Volume Adjustment (DarkGreen)
3.Standard movie position adjustment. (Red)



When one of the volume modes is selected, move the slide bar to change volume. A number representing the volume will appear in the display. After 5 Seconds the Mode will return to standard movie position Mode.

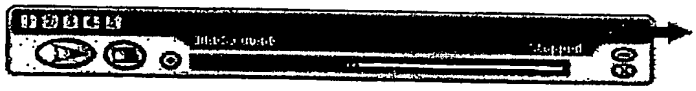
DETACHING THE CONTROL BAR



Double click on the Control Bar to detach, Double Click again on the Control Bar for it to re-attach.
(NOTE: The Control Bar will not re-attach if the Movie Screen is off the edge of your desktop.)

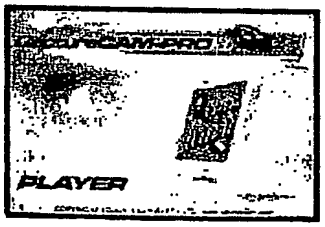
RE-SIZINGING THE CONTROL BAR

When the Control bar is Detached, you can resize the bar if you Click and drag the Right hand edge of the Control bar.



HIDE/SHOW CONTROL BAR AND OPERATE MOVIE PLAY BACK

The F11 key toggles the "Hide Control bar" function on and off.



Controlling movie playback with the Control Bar hidden.
Option 1: Tap the space bar to start and Pause Movie.
Option 2: Double Click on the play screen to Start and Pause movie.
Option 3: Right click on screen to access Menu containing Start and Pause.

HIDE / SHOW FRAME

It is possible to Hide or Show the Movie Screen Frame by holding the Alt key and tapping the F11 key. This can also be set in the Screen Menu and Control Bar Menu.

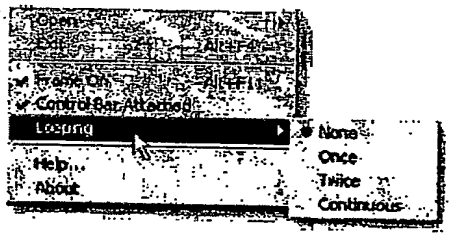
LOOPING

It is possible to set how a Movie will Loop in one of the following three ways:

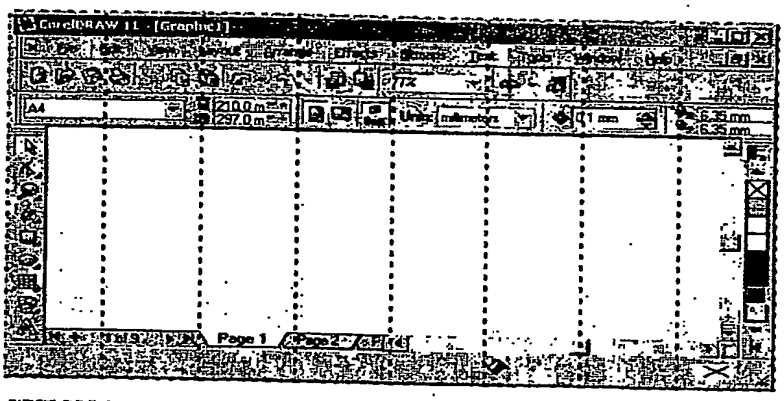
ONCE: The Movie will play through twice and then stop.

TWICE: The Movie will play through three times and then stop.

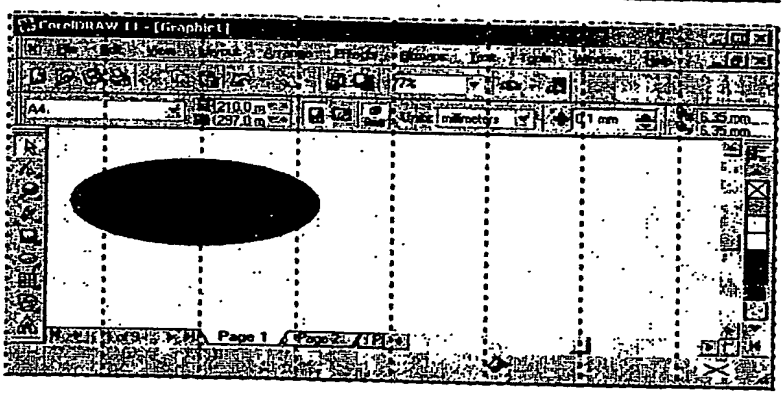
CONTINUOUS: The Movie will Loop until you click the STOP button.



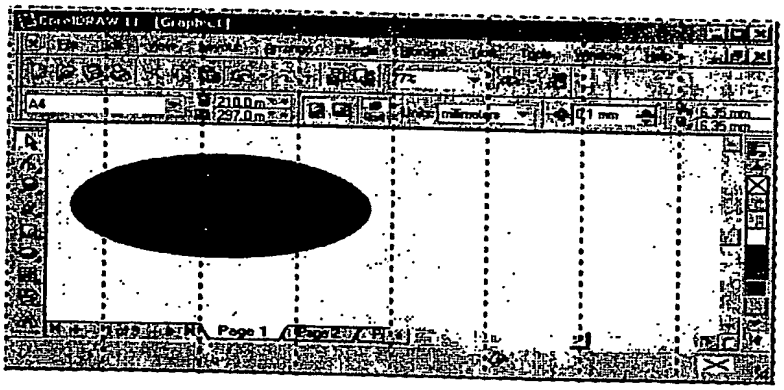
Frame 1



Frame 2



Frame 3



Frame 4

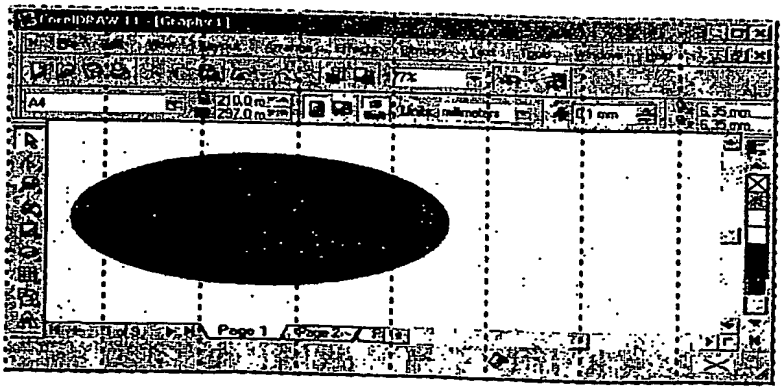


FIG. 1

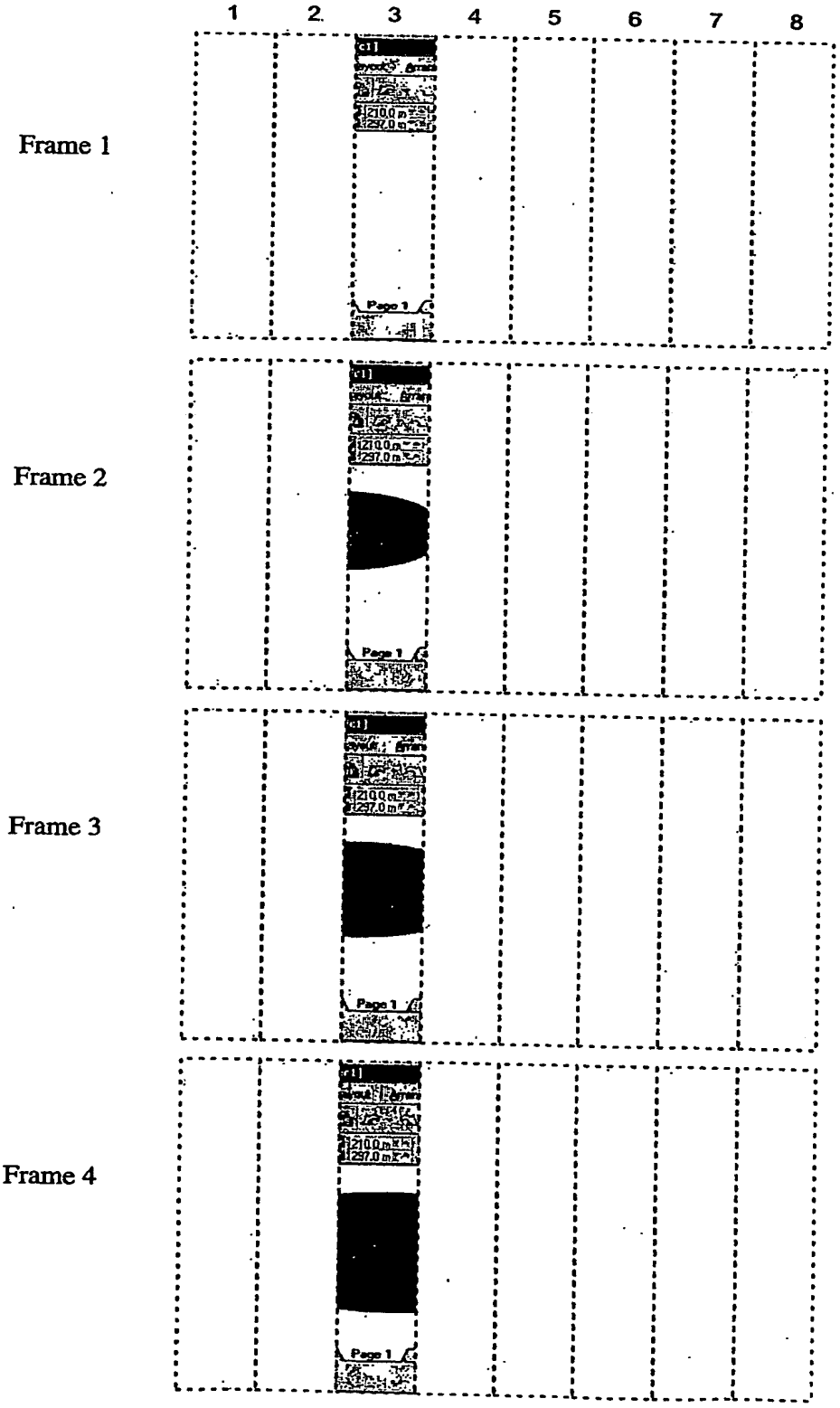


FIG. 2

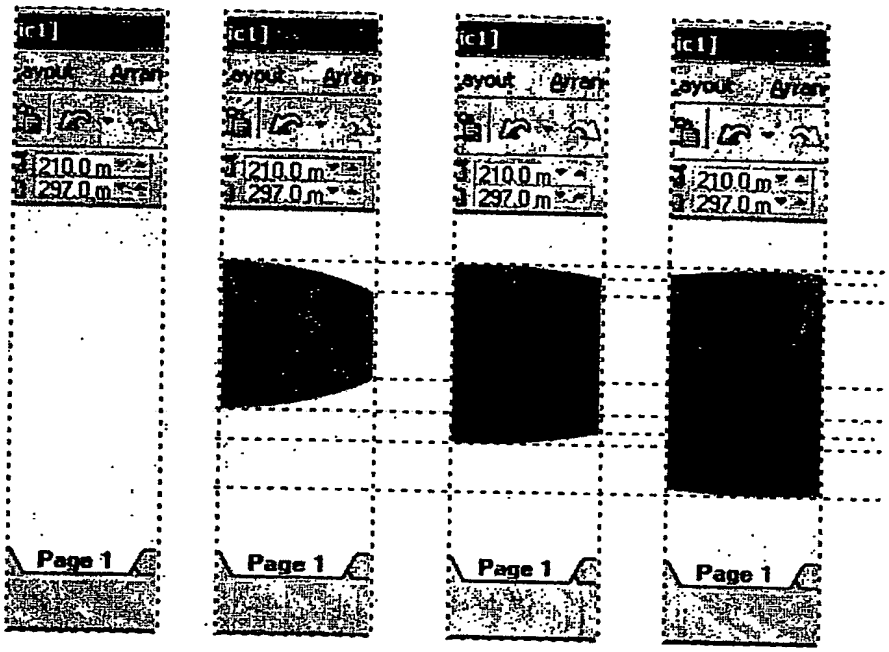


FIG. 3

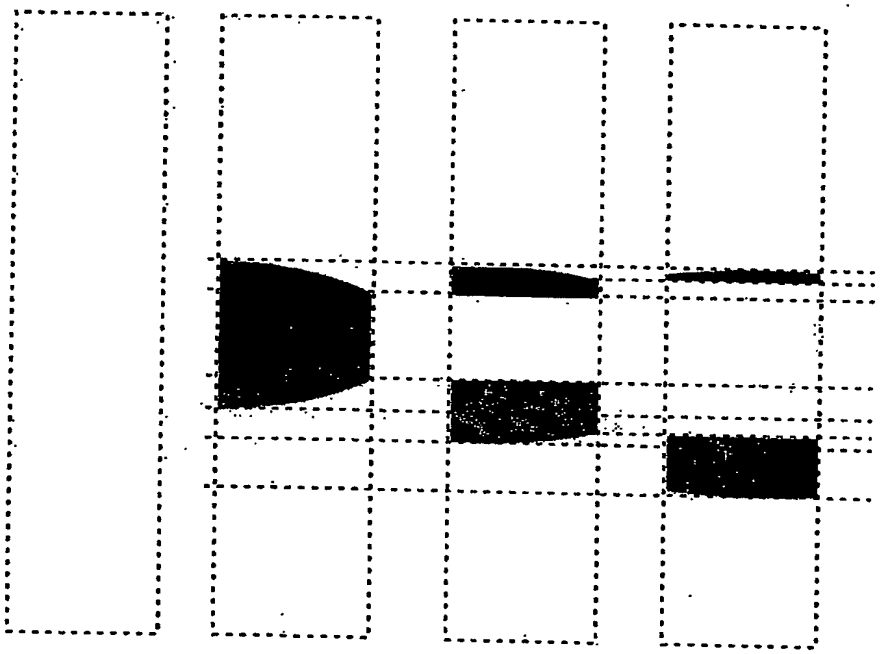


FIG. 4

FIG. 5

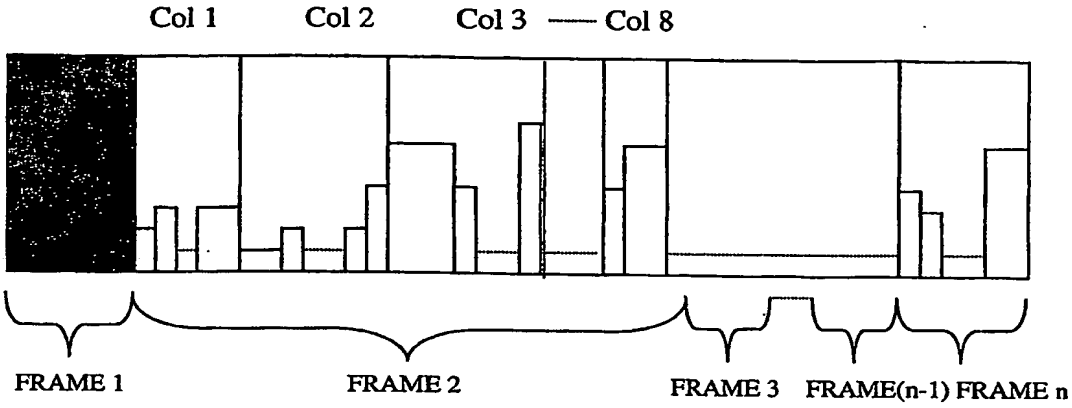


FIG. 6

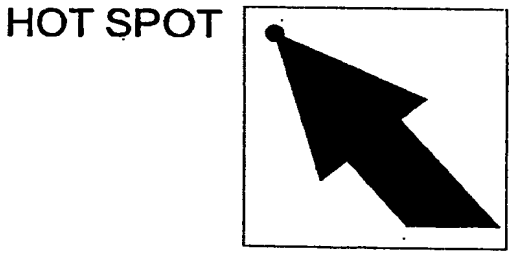


FIG. 7

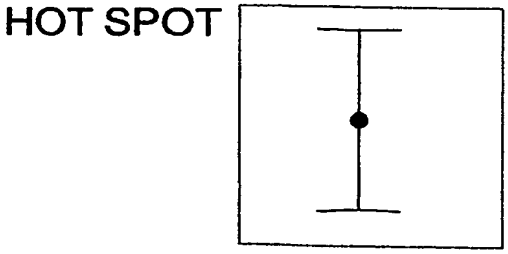


FIG. 8

Frame 1

Frame 2

Frame 3

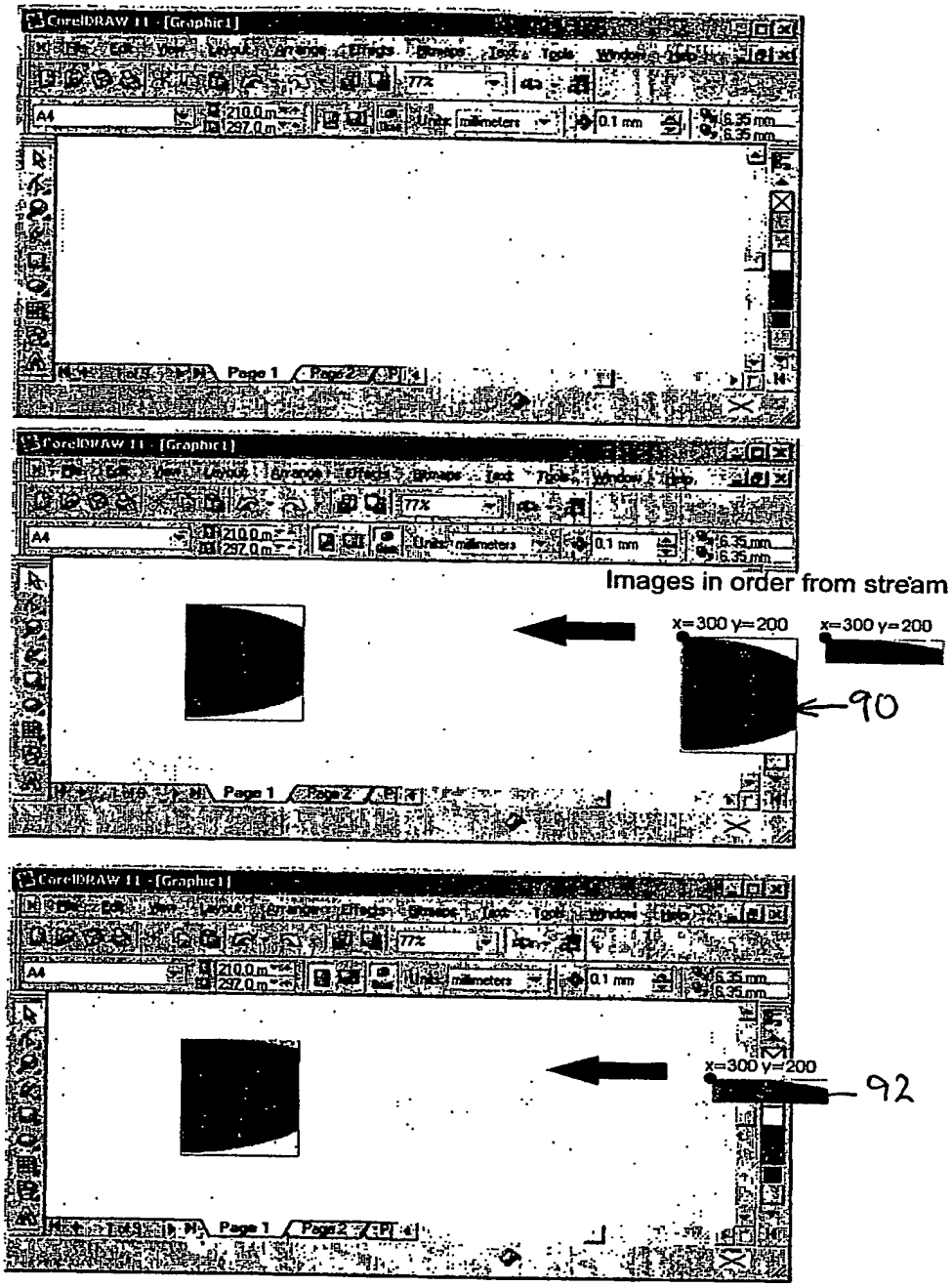


Fig. 9

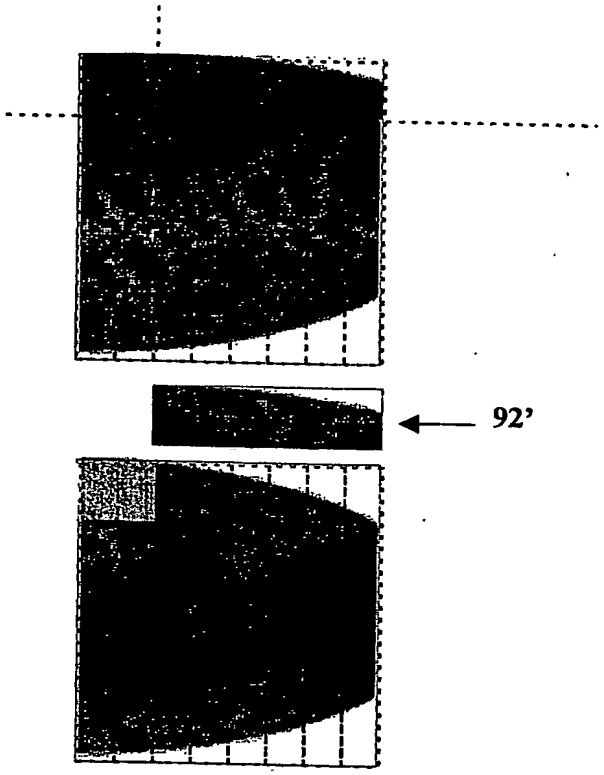


FIG. 10

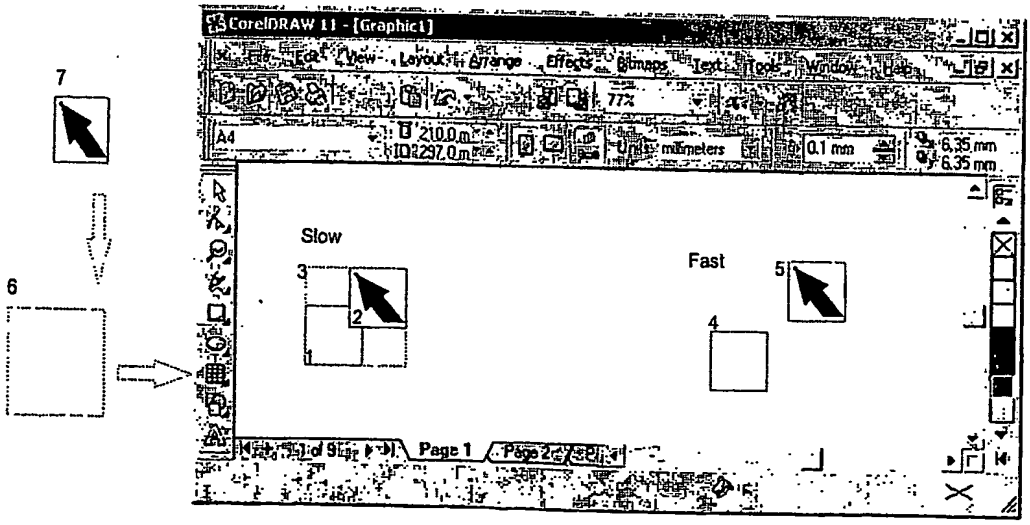


FIG. 11